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- (71) Applicant (*for all designated States except US*):
NSK-RHP EUROPEAN TECHNOLOGY CO. LIMITED [GB/GB]; Mere Way, Ruddington Fields Business Park, Ruddington, Nottinghamshire NG11 6JZ (GB).
- (72) Inventors; and
- (75) Inventors/Applicants (*for US only*): DODD, Andrew [GB/GB]; 6 Halls Brook, East Leake, Loughborough, Leicestershire LE12 6HE (GB). DICKS, Mark, Philip [GB/GB]; 20 Hine Avenue, Newark, Nottinghamshire NG24 2LH (GB). TAYLOR, Mark, Stephen [GB/GB]; 10 Bateman Road, East Leake, Loughborough, Leicestershire LE12 6LN (GB).
- (74) Agent: BARNARD, Eric, Edward; Brookes Batchellor, 102-108 Clerkenwell Road, London EC1M 5SA (GB).
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JUN 10 2003
TC 3700 MAIL ROOM

(54) Title: METHOD TO IMPROVE THE SURFACE TOPOGRAPHY OF ROLLER BEARING COMPONENTS

(57) Abstract: A method of treatment of a rolling element bearing component by hard particle abrasion to improve the surface topography of the component. The hard particle abrasion includes the steps of immersing the bearing component in a receptacle containing hard particles, preferably alumina, and agitating the component and/or hard particles to produce relative movement. Preferably the method is performed for between 10 minutes and 1 hour. The relative movement may be produced by rotating the component in one direction while the receptacle is rotated in the opposite direction. The surface finish of the component is preferably improved from around 0.13 μm to around 0.07 μm . Compressive stress in the surface of the component may also be improved, typically by between 200 MPa and 500 MPa. Rolling contact fatigue life of the component is also improved.

INTERNATIONAL SEARCH REPORT

 Internat: 00 igation No
 PCT/GB 00/02266

 A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 B24B1/00 B24B31/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B24B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 657 658 A (TIMKEN CO) 14 June 1995 (1995-06-14) page 3, line 3 - line 4 page 6, line 49 -page 7, line 19 ---	1
X	US 4 280 302 A (OHNO IETATSU) 28 July 1981 (1981-07-28) column 1, line 5 - line 10 column 2, line 29 -column 3, line 32 figure 5 ---	1-3,9,10
Y	---	8
Y	GB 1 211 710 A (KABUSHIKI KAISHA SHIKISHIMA TIPTON) 11 November 1970 (1970-11-11) page 6, line 22 - line 34 ---	8
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
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- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

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- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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- *&* document member of the same patent family

Date of the actual completion of the international search

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03/11/2000

Name and mailing address of the ISA

 European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Petrucci, L

INTERNATIONAL SEARCH REPORT

Inter. application No.
PCT/GB 00/02266

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 4-7
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

I
tion of patent family membersInternatⁿ Application No

PCT/GB 90/02266

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0657658 A	14-06-1995	US 5503481 A DE 69418836 D DE 69418836 T	02-04-1996 08-07-1999 20-01-2000
US 4280302 A	28-07-1981	NONE	
GB 1211710 A	11-11-1970	US 3513604 A	26-05-1970
EP 0061298 A	29-09-1982	NONE	
US 5593339 A	14-01-1997	US 5384990 A US 5863883 A US 5575705 A US 5681205 A US 5669945 A	31-01-1995 26-01-1999 19-11-1996 28-10-1997 23-09-1997